[6450-01-P]

DEPARTMENT OF ENERGY

Notice of Intent to Prepare an Environmental Impact Statement for High-Assay Low-Enriched Uranium (HALEU) Availability Program Activities in Support of Commercial Production of HALEU Fuel

AGENCY: Office of Nuclear Energy, Department of Energy.

ACTION: Notice of intent.

SUMMARY: In the Energy Act of 2020, the Secretary of Energy is charged with establishing and carrying out, through the Office of Nuclear Energy, a program to support the availability of uranium enriched to greater than 5 and less than 20 weight percent uranium-235 (U-235) (*i.e.*, high-assay low-enriched uranium [HALEU]), for civilian domestic research, development, demonstration, and commercial use. Consistent with the objectives of, and direction in the Energy Act of 2020, the Department of Energy (DOE) proposes to take actions to establish a temporary domestic demand for HALEU to stimulate a diverse, domestic commercial HALEU supply that could ultimately lead to a competitive HALEU market and a more certain domestic HALEU demand. To this end, DOE intends to prepare an environmental impact statement (EIS) in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations that will analyze the impacts of DOE's Proposed Action to facilitate the domestic commercialization of HALEU production and to acquire HALEU for ultimate commercial use or demonstration projects.

DATES: DOE invites public comment on the scope of the EIS during a 45-day public scoping period commencing on [**INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER***],and ending on [**INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***]. DOE will hold webcast scoping meetings on June 21, 2023, at 6:00 p.m. ET, on June 21, 2023, at 8:00 p.m. ET, and on June 21, 2023, at 10:00 p.m. ET. In defining the scope of the EIS, DOE will consider all

comments received or postmarked by the end of the scoping period. Comments received or postmarked after the scoping period end date will be considered to the extent practicable.

ADDRESSES: Written comments regarding the scope of the EIS should be sent to Mr. James Lovejoy, DOE EIS Document Manager, by mail to: U.S. Department of Energy, Idaho Operations Office, 1955 Fremont Avenue, MS 1235, Idaho Falls, Idaho 83415; or by email to *HALEU-EIS@nuclear.energy.gov*.

FOR FURTHER INFORMATION CONTACT: Further information including public meeting and registration information is available on the project website, *https://www.energy.gov/ne/haleu-environmental-impact-statement*. All requests for additional information including requests to be placed on the email list for project information should be sent to *HALEU-EIS@nuclear.energy.gov*. For information regarding the HAP or the EIS, contact Mr. James Lovejoy, *lovejojb@id.doe.gov*, (208) 526-4519. For general information on DOE's NEPA process, contact Mr. Jason Anderson, *andersjl@id.doe.gov*, (208) 526-0174.

SUPPLEMENTARY INFORMATION:

Background

DOE has an overall uranium strategy that covers a variety of enriched uranium needs, including civilian and commercial needs supported by the Office of Nuclear Energy and national security, nonproliferation, and defense needs supported by the National Nuclear Security Administration's Defense Programs, Defense Nuclear Nonproliferation, and Naval Reactors programs. Section 2001(a) of the Energy Act of 2020 (42 U.S.C. 16281; 134 Stat. 2453; Pub. L. 116-260 Div Z) charges the Secretary of Energy with establishing and carrying out, through the Office of Nuclear Energy, a program to support the availability of HALEU for civilian domestic research,

development, demonstration, and commercial use. HALEU (or "HA-LEU") is defined under the Energy Act of 2020 as "uranium having an assay greater than 5.0 weight percent and less than 20.0 weight percent of the uranium-235 isotope." 42 U.S.C. 16281(d)(4). DOE's activities to implement Section 2001(a), generally referred to as the HALEU Availability Program (HAP), include several elements, such as conducting biennial surveys of industry stakeholders to estimate the amount of HALEU needed for domestic commercial use for the subsequent 5 years; establishing a consortium of entities involved in the nuclear fuel cycle to support the availability of HALEU (including by providing survey information and purchasing HALEU made available by the Secretary for commercial use); and acquiring or providing HALEU from a stockpile of uranium owned by the Department or using enrichment technology to supply members of the consortium with HALEU for commercial use or demonstration projects.

The focus of this NOI and related EIS is DOE's implementation of Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects. The Inflation Reduction Act (section 50173) [Pub. L. 117-169] provided $700 million in support of various HALEU program activities directed in the Energy Act of 2020. From these funds, $500 million is being considered for use in stimulating a diverse commercial supply chain for HALEU. The establishment of this commercial supply of enriched uranium is a key element of DOE's uranium strategy.

The current U.S. commercial power reactor fuel cycle is based on reactor fuel that is enriched to no more than 5 weight percent U-235 (low-enriched uranium [LEU]), but many advanced reactor designs require HALEU, which is enriched to greater than 5 and less than 20 weight percent U-235. Using HALEU fuel allows advanced reactor designers to create smaller reactors that produce more power with less fuel than the current fleet of

reactors. HALEU will also allow developers to optimize their systems for longer life cores, increased safety margins, and other increased efficiencies. Although some advanced reactor technologies are currently under development, there is no domestic commercial source of HALEU available to fuel them. The lack of such a source could impede both the demonstration of these technologies being developed and the development of future advanced reactor technologies. Initial sources of uranium to meet the requirements of the HAP could be existing DOE stockpiles of highly enriched uranium (HEU) that would be processed or down-blended into HALEU (*e.g.*, activities conducted outside of the Proposed Action and that are covered by separate existing or pending NEPA documentation). As DOE stockpiles are depleted, production would need to be supplemented by or transition to commercially-operated facilities.

To accelerate development of a sustainable commercial HALEU supply capability, an initial public/private partnership is recommended to address the high-fidelity (high-confidence demand) HALEU market (*e.g.,* fuel for demonstration reactors) plus a percentage of the projected commercial demand for power reactors. The private sector could incrementally expand the capacity in a modular fashion to establish HALEU enrichment and supply that are sufficient to meet future needs as a sustainable market develops.

The development of a commercial HALEU fuel cycle would involve: (1) uranium ore production (*e.g.*, in situ-recovery), (2) conversion of the uranium ore into enrichment feed (converting the uranium ore into hexafluoride suitable for enrichment), (3) enrichment to HALEU (in particular, HALEU enriched to at least 19.75 and less than 20 weight percent U-235), (4) deconversion (conversion of the uranium hexafluoride into forms suitable for fuel fabrication), (5) transportation services for HALEU (*e.g.,* from the enrichment site to the deconversion site), and (6) storage capability. The EIS will

evaluate implementation of the Proposed Action of facilitating the commercialization of HALEU production and DOE's acquisition of HALEU, including the direct and reasonably foreseeable indirect effects of that acquisition.

Certain activities related to the Proposed Action are regulated by other agencies, including, but not limited to the Nuclear Regulatory Commission (NRC) and the Department of Transportation. DOE expects that permits, license amendments, and/or licenses may be required for activities such as mining/recovery; the operation of a conversion facility; the construction and operation of enrichment facilities, a deconversion facility, and HALEU storage facilities; and HALEU transportation. DOE will coordinate with Agreement States[1] and agencies with regulatory authority, utilize existing and related analyses of other agencies, and incorporate, as appropriate, information to ensure a robust and efficient DOE NEPA analysis, as well as to streamline and inform the process at DOE and with other entities with NEPA responsibilities related to the Proposed Action.

Purpose and Need for Agency Action

One of the aspects of a clean energy future is sustainment and expanded development of safe and affordable nuclear power. One key element of that goal is the availability of fuel to power advanced reactors. DOE is committed to support the development and deployment of the HALEU fuel cycle and to acquire and provide HALEU as authorized by Congress in Section 2001 of the Energy Act of 2020.

Development of innovative technologies, including the next generation of advanced reactors, and advanced fuels, will help ensure that nuclear power continues to

[1] An Agreement State is a State that has entered into an agreement with the NRC that gives the State the authority to license and inspect byproduct, source, or special nuclear materials used or possessed within their borders.

bolster America's energy security by providing a source of resilient, carbon-free power in the United States.

There is currently insufficient private incentive to invest in commercial HALEU production due to the current market base. There is also insufficient incentive to invest in the necessary commercial deployment of advanced reactors because the domestic fuel supply chain does not exist. The Energy Act of 2020 aims to stimulate HALEU supply to support the development, demonstration, and deployment of advanced reactors in a manner that establishes a diversity of supply and healthy market forces for the future. This concern is a consistent theme in the industry responses to DOE's *Request for Information Regarding the Establishment of a Program to Support the Availability of High-Assay Low-Enriched Uranium* (the "RFI") (86 FR 71055–71058; December 14, 2021). These responders emphasized the importance of the HALEU consortium that is called for in the Energy Act of 2020 and that DOE established on December 7, 2022 (87 FR 75048). Responders also emphasized the opportunity for DOE to be an agent for stability (both in assuring HALEU availability and market price certainty) during the initial phase of HALEU fuel production.

DOE predicts that by the mid-2020s, approximately 22 metric tons of uranium (MTU) of HALEU will be needed for initial core loadings to support DOE's reactor demonstrations and research reactors that were converted from highly enriched uranium fuel with a high-fidelity HALEU (up to 19.75 weight percent U-235 enrichment) with demand of between 8 and 12 MTU annually for the next 10 years and increasing to over 50 MTU by 2035. Additionally, the Nuclear Energy Institute (NEI) surveyed its utility members that plan to utilize HALEU to identify their estimated annual needs through 2035. This survey estimated industry requirements could be as high as 600 MTU of HALEU at between 10.9 and 19.75 weight percent enriched U-235 per year by 2035.

Both DOE and industry groups have recognized that DOE action is needed to facilitate the development of the infrastructure that would support the availability of HALEU fuel to support both near-term research and demonstration needs and to support the U.S. commercial nuclear industry. DOE and the NEI recognize that the main challenge to establishing a commercial HALEU-based reactor economy is the upfront capital investment of more than $500 million (an NEI estimate and consistent with the Inflation Reduction Act funds appropriated to DOE) required to establish the capability of producing quantities of HALEU suitable for commercial fuel fabrication facilities needed for the various types of HALEU reactors proposed.

Proposed Action

The Proposed Action is to acquire, through procurement from commercial sources, HALEU enriched to at least 19.75 and less than 20 weight percent U-235 over a ten-year period of performance, and to facilitate the establishment of commercial HALEU fuel production. The Proposed Action implements Section 2001(a)(2)(D)(v) of the Energy Act of 2020 for the acquisition of HALEU produced by a commercial entity using enrichment technology and making it available for commercial use or demonstration projects. The Proposed Action would be conducted in a manner that prioritizes social equities and the constructive engagement with disadvantaged communities.

Given the variety of HALEU applications, the initial capability is intended to be flexible and able to accommodate:

- Enrichments of U-235 to greater than 5 and less than 20 weight percent;
- Production of between 5 and 145 MTU of HALEU;
- Modular HALEU fuel cycle facility design concepts to accommodate future growth; and

- Deconversion of uranium hexafluoride to forms suitable for production of a variety of uranium fuels, to include oxides and metal.

The NEPA coverage for the Proposed Action will address a broad range of activities. The EIS will analyze reasonable alternatives and the no action alternative, and address the following activities facilitating the commercialization of HALEU fuel production and acquisition of HALEU:

- Extraction and recovery of uranium ore (from domestic and/or foreign sources);
- Conversion of the uranium ore into uranium hexafluoride;
- Enrichment (possibly in up to three steps)
    - Enrichment to LEU to no more than 5 weight percent U-235,
    - Enrichment to HALEU greater than 5 and less than 10 weight percent U-235, and
    - Enrichment to HALEU from 10 to less than 20 weight percent U-235 in an NRC Category II facility;[2]
- Deconversion of the uranium hexafluoride to uranium oxide, metal, and potentially other forms in an NRC Category II facility;
- Storage in an NRC Category II facility;
- DOE acquisition of HALEU; and
- Transportation of uranium/HALEU between facilities.

[2] NRC classifies special nuclear materials (SNM) and the facilities that possess them into three categories based upon the materials' potential for use in nuclear weapons, or their "strategic significance." The NRC's physical security requirements differ by category, from least stringent for Category III facilities to most stringent for Category I facilities. NRC Category III Facility (low strategic significance), includes facilities containing uranium at enrichments of less than 10 weight percent U-235. NRC Category II Facility (moderate strategic significance), include facilities containing uranium at enrichments from 10 weight percent to less than 20 weight percent U-235. NRC Category I Facility (strategic special nuclear material), include facilities containing uranium at enrichments equal to or greater than 20 weight percent U-235.

In addition to the activities above, there are several reasonably foreseeable activities that could result from implementation of the Proposed Action. They include:

- Fuel fabrication for a variety of fuel types in an NRC Category II facility;
- Reactor (demonstration and test, power, isotope production) operation; and
- Spent fuel storage and disposition.

While not specifically a part of the Proposed Action, the impacts from these reasonably foreseeable activities would be acknowledged and addressed to the extent practicable.

Potential Environmental Issues for Analysis

DOE proposes to address the issues listed in this section when considering the potential impacts of the Proposed Action:

- Potential effects on public health from exposure to radionuclides under routine and credible accident scenarios, such as natural disasters (floods, hurricanes, tornadoes, and seismic events).
- Potential impacts on surface and groundwater, floodplains and wetlands, and on water use and quality.
- Potential impacts on air quality (including climate change) and noise.
- Potential impacts on plants, animals, and their habitats, including species that are Federal- or state-listed as threatened or endangered, or of special concern.
- Potential impacts on geology and soils.
- Potential impacts on cultural and historic resources.
- Socioeconomic impacts on potentially affected communities.
- Potential disproportionately high and adverse effects on minority and low-income populations.

- Potential impacts on land-use plans, policies and controls, and visual resources.
- Potential impacts on waste management practices and activities.
- Potential impacts from the transportation of HALEU-related radioactive materials.
- Potential impacts of intentional destructive acts, including sabotage and terrorism.
- Unavoidable adverse impacts and irreversible and irretrievable commitments of resources.
- Potential cumulative environmental effects of past, present, and reasonably foreseeable future actions.
- Compliance with all applicable Federal, state, and local statutes and regulations, and with international agreements, and required Federal and state environmental permits, consultations, and notifications.

Public Scoping Process

NEPA implementing regulations require an early and open process for determining the scope of an EIS and for identifying the significant issues related to a proposed action. To ensure that a full range of issues related to the Proposed Action are addressed, DOE invites Federal agencies, state, local, and tribal governments, the general public, and the commercial community to comment on the scope of the EIS. Specifically, DOE invites comment on the identification of reasonable alternatives and information and analyses relevant to the Proposed Action and specific environmental issues to be addressed. Analysis of written and oral public comments provided during the scoping period will help DOE further identify concerns and potential issues to be considered in the Draft EIS.

Virtual Scoping Meeting Information

DOE will host three interactive webcasts during the scoping period as listed under the **DATES** section. The purpose of the webcasts is two-fold: the first is to provide the public with information about the NEPA process and the Proposed Action and the second is to invite public comments on the scope of the EIS.

The webcasts will begin with presentations on the NEPA process and the Proposed Action. Following the presentations, there will be a moderated session during which members of the public can provide oral comments on the scope of the EIS. Commenters will be allowed 3 minutes to provide comments. Comments will be recorded.

DOE recommends that members of the public who would like to provide oral comments pre-register for the virtual scoping meetings. Although pre-registration is not required, pre-registered attendees will have prioritized oral comments in the limited 50-minute comment period. Those who attend as a guest will also be able to provide comments but will be added to the end of the comment queue during the meeting. In addition to prioritized comments, advanced registration will allow attendees to receive meeting reminders about their registered event(s). Upon registration, an email containing a unique link to join the meeting will be provided. All links to pre-register for the event will close at noon (ET), June 21, 2023. Parties interested in attending as a guest will not receive email reminders on their chosen event, but the links to attend as a guest will remain open until the meeting concludes. To obtain additional information, meeting links, and audio-only call-in options, please visit *https://www.energy.gov/ne/haleu-environmental-impact-statement*. Written comments will be accepted by mail and email at the addresses identified in the **ADDRESSES** section.

Projected EIS Schedule

DOE expects to announce the availability of the Draft EIS in the *Federal Register* by the end of 2023. This will initiate the public comment period on the Draft EIS during which DOE will hold public hearings. DOE will consider all comments on the Draft EIS received during the public comment period (and to the extent practicable, comments received or postmarked after the public comment period end date) in developing the Final EIS. Availability of the Final EIS is planned to be announced in the *Federal Register* in mid-2024. Publication of the Record of Decision (ROD) will follow no sooner than 30 days after publication of the Final EIS.

Signing Authority

This document of the Department of Energy was signed on May 24, 2023, by Dr. Kathryn Huff, Assistant Secretary for Nuclear Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by the Department of Energy. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned Department of Energy Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC on May 31, 2023.

Treena V. Garrett,
Federal Register Liaison Officer,
U.S. Department of Energy.
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